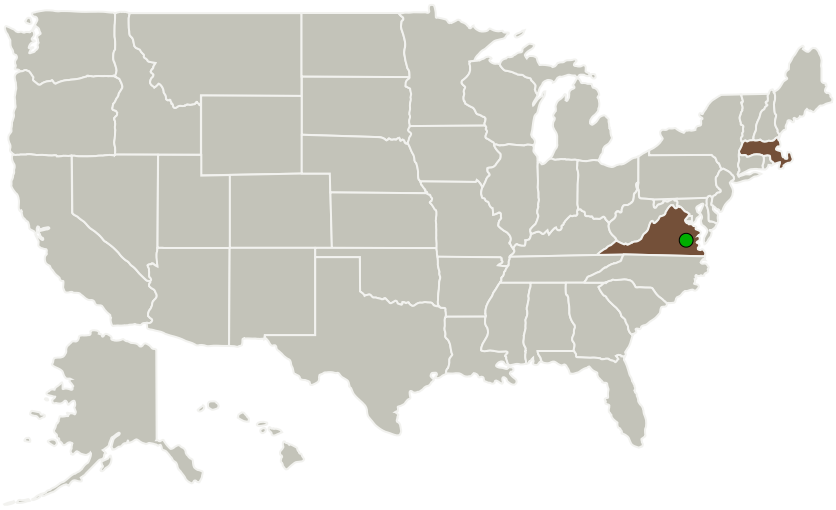
Precision Surface Temperature Mapping for Heat Shield Testing, Phase I

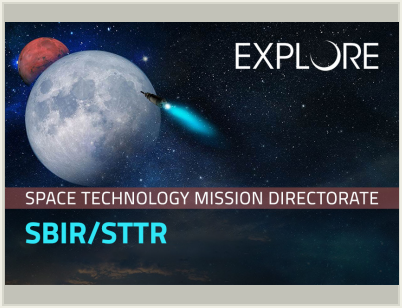
Completed Technology Project (2012 - 2012)

Project Introduction

Development of hypersonic flight vehicles for airbreathing access to space and for planetary entry poses several design challenges. One of the primary obstacles is the large uncertainty in predictive capability of models of the aerothermal environment to which these vehicles are subjected. A high priority need for the ground test facilities is instruments which enable remote thermal imaging of entry vehicles with high temperature and spatial resolution, and lower uncertainty than the state-of-the art. Bodkin Design & Engineering (BDE), with our partners Spectral Sciences, Inc (SSI) and Space Computer Corporation (SCC), has demonstrated a Precision Radiometric Surface Temperature (PRST) sensor to perform stand-off measurements of radiatively heated surfaces. We propose to adapt this system to the needs of ground test facilities for testing of hypersonic re-entry vehicles. The sensor will be capable of stand-off imaging of heated surfaces at ranges from 1 to 100+ meters, measuring surface temperatures from 300-4000K, and providing surface temperature maps with spatial resolution of at least 120x120 pixels. Further, the system will operate as a fast snapshot imager, capable of recording surface temperature data at up to 120 frames per second.

Primary U.S. Work Locations and Key Partners





Precision Surface Temperature Mapping for Heat Shield Testing, Phase I

Table of Contents

Precision Surface Temperature Mapping for Heat Shield Testing, Phase I

Completed Technology Project (2012 - 2012)

Organizations Performing Work	Role	Type	Location
Bodkin Design & Engineering	Lead Organization	Industry	Newton, Massachusetts
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Massachusetts	Virginia

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138421)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Bodkin Design & Engineering

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

James Daly

Co-Investigator:

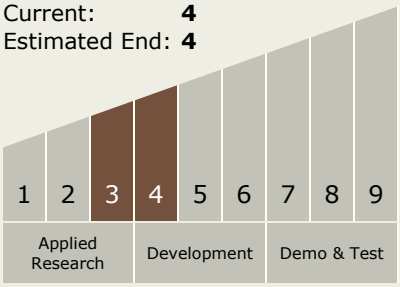
James Daly

Precision Surface Temperature Mapping for Heat Shield Testing, Phase I

Completed Technology Project (2012 - 2012)

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.1 Aeroassist and Atmospheric Entry
    - TX09.1.1 Thermal Protection Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System